

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
WATER DIVISION

**APPENDIX B**  
CLEAN MICHIGAN INITIATIVE, CLEAN WATER FUND  
ABANDONED WELL MANAGEMENT GRANT CONTRACT  
ABANDONED WELL PLUGGING BID SPECIFICATIONS

**PART ONE – GENERAL**

**1.1 SCOPE OF WORK**

The work to be done shall consist of furnishing all labor, materials, and equipment for the complete and satisfactory plugging of abandoned wells.

A list of locations (owner names and addresses) where abandoned wells are to be plugged under this subcontracted Agreement shall be provided to the bidding subcontractors and shall be attached as Schedule I, (Abandoned Well Locations). It is recommended that all interested bidders thoroughly examine the technical specifications for this work and make an examination of the abandoned well locations to determine the details of proposed abandoned well plugging work.

In some cases it may be impractical to plug an abandoned well due to its location, such as an abandoned well located under the foundation of a structure. In the event that the subcontractor determines that a listed abandoned well is inaccessible for plugging, the subcontractor shall notify the communities' AWM Grant manager and schedule a site meeting/consultation to determine the course of action. The decision on how to proceed will be made by the communities' AWM Grant manager based upon consultation with the State.

**1.2 REGISTRATION**

Only Michigan registered water well drilling contractors may conduct abandoned well plugging activities under this subcontract Agreement (including removal of obstructions from wells).

The Grantee and all subcontractors shall comply with all federal, state, and local laws and ordinances relating to performance of the work. Unless otherwise provided for in these contract specifications or under written directive from the State, all work is to be done in accordance with Part 127, Michigan Water Well Construction and Pump Installation Code, 1978 PA 368, as amended (Act 368), and the specifications described therein.

**1.3 UTILITIES FOR CONSTRUCTION**

Unless otherwise provided for in these specifications, the subcontractor shall furnish his own source of electricity, fuel, and water required to perform the work and shall bear the cost of these services.

#### 1.4 PROTECTION OF PROPERTY

The subcontractor shall properly protect all surface and subsurface structures and surrounding areas from damage, which may result from the methods employed in performing the work. The subcontractor shall be responsible for any damages to such structures resulting from his operations. Damaged property shall be repaired or replaced to a condition that is equal to what existed prior to damage. The communities' AWM Grant manager, after consultation with the State, shall have the right to approve these restoration measures.

#### 1.5 NOTIFICATION OF UTILITIES

The Grantee and subcontractor shall comply with 1974 PA 53. Either shall notify the public utilities of any proposed excavating at least 48 hours prior to the commencement of such activities by contacting MISS DIG.

#### 1.6 PLUGGING OF AND DISPOSAL OF WATER FROM ABANDONED FLOWING WELLS

The subcontractor shall contact the communities' AWM Grant manager and the State for technical assistance in all cases where abandoned flowing wells are encountered. Only preapproved plugging procedures, as authorized on a site-by-site basis by the State, shall be used to plug flowing wells under this contract. During the plugging procedure, the subcontractor shall make all provisions necessary for conveying any water from abandoned flowing wells away from adjacent structures and surface waters and shall take measures necessary to prevent erosion and/or flooding of the site and adjacent properties.

#### 1.7 SITE CLEANUP AND RESTORATION

The subcontractor shall provide all material and labor to maintain the abandoned well plugging sites in an orderly condition. The subcontractor shall remove and properly dispose of all pumping equipment, drop pipes, pitless adapter parts, seals, pump rods, or other materials or obstructions removed from the well. Where the property owner requests to keep the pump or parts removed from the well, the subcontractor shall honor the request.

The subcontractor shall keep the site free from accumulation of waste materials, rubbish, or other debris resulting from the work. The subcontractor shall assure that each abandoned well plugging site is properly restored, including removal of access grout material and grout packaging, filling and leveling of excavations, placement of topsoil and seed, and repair of damage to landscaping. Special site restoration activities that may be deemed necessary shall be listed in the prebid specifications.

#### 1.8 SAFETY

The subcontractor shall comply with all applicable laws and regulations governing the furnishing and use of safeguards, safety devices, and protection equipment. The subcontractor shall take any necessary precautions to protect the life and health of employees and the public in the performance of the work.

## 1.9 TIME OF COMPLETION

The subcontractor shall begin work on the listed abandoned well plugging sites within 30 days from the date the subcontracted Agreement is awarded. All work by the subcontractor shall be completed within 180 days from the date the subcontract is issued, unless otherwise approved by the communities' AWM Grant manager and the State.

## **PART TWO – METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

### 2.1 EXCAVATION OF BURIED ABANDONED WELL CASINGS

Payment for excavating buried abandoned well casings and site restoration shall be on the basis of the unit price per hour and shall include all labor, material, and equipment to locate and expose the abandoned well casing, backfill the excavation, including well pits, and perform site restoration.

### 2.2 CASING REMOVAL, UNGROUTED ANNULUS

Payment for removal of well casing shall be on a lump sum basis and shall include all labor, material, and equipment to remove the well casing from the borehole.

Where it is determined during an abandoned well search activity or during an on-site inspection by the communities AWM Grant manager or a subcontractor that an open annulus is present around an abandoned well casing, proper plugging of both the open annulus and the abandoned well casing shall be completed. For purposes of bids, a 2-hour time allowance shall be utilized. Where additional time is documented on individual sites, a cost adjustment may be approved by the State based upon submission of appropriate expense records at the time of contract reimbursement. Plugging of the annulus may be accomplished by any of the following methods:

- A. Jet tremie pipe along side of the abandoned well casing to the bottom of the open annulus and grout the entire annulus from the bottom up to the surface
- B. Remove the abandoned well casing and grout the entire borehole from the bottom up to the surface
- C. Perforate or rip the abandoned well casing and pressure grout the open annulus and casing
- D. Over drill the abandoned well casing and grout the entire borehole from the bottom up to the surface

### 2.3 WELL PLUGGING COST DETERMINATION

The subcontractor shall provide a (written) bid to plug the listed abandoned wells. Payment for plugging the abandoned wells shall be based on:

- A. A unit price per foot of well depth (measured, obtained from well log records, or estimated) and based upon the diameter of the abandoned well casings.
  - 1. Prior to the subcontractor plugging an abandoned well, the well depth and casing diameter shall be determined and documented by the subcontractor and this information provided to the community.
  - 2. The community may require the contractor to demonstrate the depth of the abandoned well, after obstruction removal, but before beginning the plugging operation. Demonstration may include measurement by the subcontractor with a representative of the community being present.
- B. Obstruction removal expenses, based upon two hours per well.
- C. All labor, material, and equipment necessary to place the plugging material into the borehole or well casing utilizing placement methods approved by the State.

## **PART THREE – MATERIALS**

### **3.1 PLUGGING MATERIALS**

- A. Neat cement grout - a mixture of one bag (94 pounds) of Type I Portland cement to not more than 6 gallons of clean water, as defined in R 325.1603a(1), Rule 103a(1), definitions; N and O.
- B. Concrete grout - a mixture of one bag (94 pounds) of Type I Portland cement to an equal amount of dry sand to not more than 6 gallons of clean water, as defined in R 325.1602(3), Rule 102(3), definitions; C and D.
- C. Bentonite chips - crushed high swelling sodium bentonite. The minimum particle size shall be 3/8 inch in diameter, as defined in R 325.1601a (4), Rule 101a (4), definitions; B.
- D. Bentonite grout (slurry) – a mixture of bentonite and water that has a high solids concentration and minimum density that meets specifications approved by the State.
- E. Other materials, (such as aggregate for use in fractured rock formations) in combination with the above, as approved in writing in advance by the State.

### **3.2 GROUTS AND GROUT/FLUID ADDITIVES**

Bentonite slurry grouts; special cements; or other admixtures to the grout material to reduce permeability, increase fluidity, control time of set, or alter the slurry composition in any way, shall not be used unless approved in advance by the State.

## **PART FOUR – COMPLETION OF WORK**

### **4.1 GENERAL REQUIREMENTS**

The subcontractor shall maintain a complete and accurate record of the plugging operation, including the type of plugging material used, volume of material used, and method of placing the plugging material into the well. A written record shall be available for inspection on site at the request of the communities' AWM Grant manager or the State. The completed well plugging record shall be submitted to the State within 60 days of completion of the plugging operation. Payment to the subcontractor shall be withheld by the communities' AWM Grant manager until the abandoned well plugging record has been submitted. Water necessary for preparing plugging slurries shall be obtained by the subcontractor at his own expense from a source satisfactory to the community and the State.

### **4.2 OBSTRUCTION REMOVAL AND SALVAGE RIGHTS**

The subcontractor shall remove all obstructions from the well that may hinder proper plugging. Obstructions may include: pump rods, drop pipes, packers, submersible pumps, pump parts, shafts, support structures, wires, pitless adapter parts, draw down seals, jet assemblies, rock, brick, concrete, wood, soil, or any other material that may prevent free flow of grout to the bottom of the well. A time and materials record shall be maintained for each abandoned well cleared of obstructions. This record shall be submitted to the communities' AWM Grant manager by the subcontractor. For bid purposes, a 2-hour time allocation shall be assigned per abandoned well. Where it appears that an obstruction may not be extractable, the subcontractor shall contact the community's AWM Grant manager and the State before continuing with the plugging operation. The State shall make a determination on the proper course of action and issue a directive on how to proceed.

Electrical disconnections of the pumping equipment shall be made in accordance with applicable electrical codes.

All drop pipe, packer jets, check valves, screens, pumps, or other fittings removed from the well by the subcontractor are the property of the well owner. In each individual case, prior to beginning obstruction removal operations, the subcontractor shall determine if the property owner wishes to keep the well pump, drop pipe, or other parts. The owner's response shall be documented by the subcontractor on a form provided by the community and the completed form shall be returned to the community's AWM Grant manager along with the abandoned well plugging record.

Where the abandoned well owner does not wish to retain the parts removed from the abandoned well, the subcontractor shall remove them from the work site within 10 days. All materials removed from the wells shall be disposed of properly by the subcontractor unless other arrangements are made with the communities' AWM Grant manager.

#### 4.3 UNGROUTED ANNULUS

If a visible open annulus around the well casing is present, the annulus shall be sealed in accordance with Section 4.6.A of these specifications.

#### 4.4 CASING TERMINATION

Where removal of the casing is not required, the subcontractor shall:

- A. Cut the casing off 48 inches below grade.
- B. Cut the casing off not more than 3 inches above a basement floor.
- C. In a well pit where water does not collect, the abandoned well casing shall be cut off not more than 3 inches above the bottom of the well pit and the well pit back filled with sand.
- D. In a well pit that may collect water, has an enclosed concrete bottom, or is located in an area characterized by clay soils (nondraining), the casing shall be cut off not more than 3 inches above the bottom of the pit floor and a minimum of one side of the well pit or the pit floor shall be removed, so that water will not collect in the pit structure. The pit shall be back filled with native soil or sand.

#### 4.5 SITE RESTORATION AND CLEANUP

Upon completion of the work, the subcontractor shall remove from the premises all materials, debris, tools, machinery, excess plugging material, or other items that have accumulated on structures or around the premises during the plugging process.

The area disturbed by the plugging operations shall be restored as much as practicable to its condition before the work began. This shall include backfilling, grading, placement of topsoil and seeding the disturbed areas.

#### 4.6 PLUGGING PROCEDURES

Wells shall be plugged in accordance with R 325.1663, Rule 163, Abandoned wells and dry holes; plugging method; and R 325.1664, abandonment of wells; plugging material, of the State Act 368.

- A. Slurry mixture and pumping - When neat cement slurry or concrete slurry is used, it shall be placed into the well by pumping down a tremie pipe of at least one inch inside diameter that has been placed to the bottom of the well to avoid segregation or dilution of sealing materials. The slurry shall be applied in one continuous operation until the well is filled. The tremie pipe shall be submerged in the slurry at all times during slurry placement. Equipment used for pumping cement grout shall be of the diaphragm, piston, gear, or helical type. The subcontractor shall be responsible for determining, in advance, the amount of slurry required to plug the well. When using neat cement in rock formations, 15 percent shall typically be added to the estimate to account for loss into the formation. Appendix IV of the Groundwater Quality Control Rules booklet may be used as a guide.

- B. Cement slurries - Neat cement or concrete slurries shall be prepared by adding cement, or sand and cement, to the calculated required volume of clean water. The material shall be mixed in the mixing equipment until it is adequately mixed and free of lumps, then immediately pumped into the well without delay.
- C. Bentonite chips - Where bentonite chips are used, they shall be poured slowly through a 1/8 inch mesh hardware cloth screen, at an even rate not to exceed 10 pounds of material per minute, into the top of the well casing. Fine bentonite dust and particles that accumulate in the bottom of the shipping container shall not be used because they can cause bridging of the plugging material.

A work pipe or weighted drop string shall be placed in the well and the height of accumulated plugging material measured after each 50 pounds of bentonite is placed in the well. If measurement indicates that bridging of plugging material has occurred, a work pipe, drill rods, or other weighted device shall be run into the casing to break the bridge. The plugging operation shall continue until the bentonite appears at the surface. Chips are typically poured into a casing where water is visible or apparent. Where no water is apparent in the abandoned well casing, water shall be poured into the casing after every 5 feet of plugging material is added to promote expansion of the bentonite in the dry zone above the static water level.

#### 4.7 DOCUMENTATION

Upon completion of all work, the subcontractor shall submit the following items to the Grantee.

- A. An itemized bill for each abandoned well plugged. The bill must include the name and address of the property owner and the address of the site where the well is located.
- B. A completed abandoned well plugging record form EQP 2044 or a copy of the Wellogic entry record for each abandoned well plugged.

#### 4.8 BID SHEET

- A. The attached bid sheet is recommended for use with CMI, AWM Grant projects.
- B. Where a different bid sheet or document is used, the well plugging cost estimates shall be based on abandoned well diameter and unobstructed depth. The bidding subcontractor shall provide both an itemized estimate and a total cost inclusive of all aspects of the obstruction removal, plugging, and site restoration process.